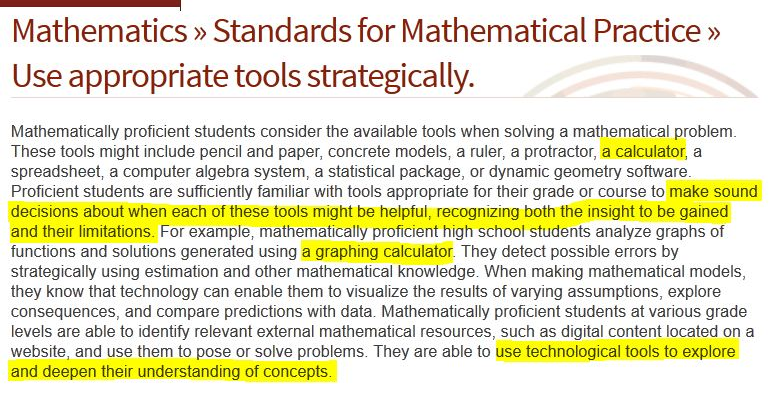
**Common Core and 'Appropriate Tools': Calculators, Spreadsheets, Etc.**

By [Erik Robelen](http://www.edweek.org/ew/contributors/erik.robelen.html) on August 29, 2013 12:54 PM

Calculators. Protractors. Spreadsheets. Computer algebra systems. Dynamic geometry software. You might not realize it, but the Common Core State Standards for mathematics make explicit reference to the use of all these tools, and others, in learning math.

I discovered this as I was gathering information for a recent [*Education Week* story about calculator policies](http://www.edweek.org/ew/articles/2013/08/21/01calculators_ep.h33.html) for the forthcoming common-core exams. It turns out that the standards have a lot to say about using technology.

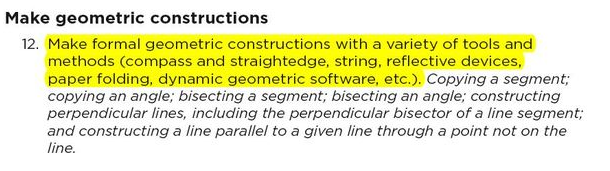
The first place you'll want to look is in the [Standards for Mathematical Practice](http://www.corestandards.org/Math/Practice). These are the eight standards that are meant to be woven across all grade levels that focus on key practices such as making sense of problems, reasoning abstractly and quantitatively, and constructing viable arguments. The fifth practice standard is titled, 'Use Appropriate Tools Strategically.' Here it is:



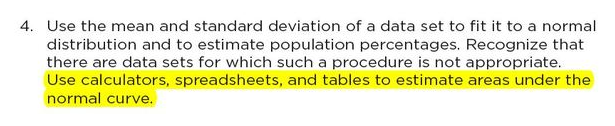
As I noted in my calculator story, several math educators and experts praised this idea of "appropriate use." Of course, as the comments section in my story reveals, finding consensus on what is the appropriate use of a calculator, for instance, is no easy task. Views vary widely. I'll leave that to others to sort out. But here I wanted to highlight a few more examples of what the standards have to say about use of technology. It shows up not just in this practice standard, but also in some of the content standards starting at the middle school grades.

(Hat tip to the folks at Texas Instruments, by the way, who provided me with a copy of the standards that highlights virtually all references to using technology in math. It saved me a lot of time.)

So, here is a quick sampling to give you an idea of what the standards have to say. I'll start with a reference in the high school geometry section:



This high school standard on "Interpreting Categorical and Quantitative Data" suggests the use of several tools.



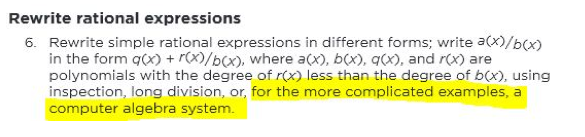
The high school standards for number and quantity include this paragraph:

Calculators, spreadsheets, and computer algebra systems can provide ways for students to become better acquainted with these new number systems and their notation. They can be used to generate data for numerical experiments, to help understand the workings of matrix, vector, and complex number algebra, and to experiment with non-integer components.

In high school algebra, the standards suggest uses for spreadsheets of computer algebra systems.

A spreadsheet or a computer algebra system (CAS) can be used to experiment with algebraic expressions, perform complicated algebraic manipulations, and understand how algebraic manipulations behave.

Here's a specific example:



One thing I did notice, however, is that specific examples of technology use don't start appearing in the content standards until the middle school grades, and most appear at the high school level. One analyst tells me that the standards, in effect, give folks on either side of the calculator and technology debate something to tout. For those who believe calculators have a place in elementary schools, for instance, they can point to the Standards for Mathematical Practice. Those who don't will surely note that no specific examples of calculator use show up until the secondary level.

If the work of the common-core-assessment consortia are an indicator, both the policy issued by PARCC and the draft policy for Smarter Balanced explicitly prohibit most students from using any calculator on the grades 3-5 exams. At middle and high school, they allow the use of increasingly sophisticated online calculators. But even at those higher grade levels, both are planning to have calculator "on" and "off" sections.

Representatives from both consortia told me that one of the prime drivers in designing their policies was what the standards say. And that comes back to the standards' embrace of "appropriate use" of technological devices. But there is surely plenty of room for debate about what "appropriate" means.

<http://blogs.edweek.org/edweek/curriculum/2013/08/common_core_and_appropriate_to.html>